

For the following problems:

- Read the scenario
- Write down the important info
- Decide what test or interval to use
- Write down the formula (interval or test statistic) with numbers

1 prop Z Interval

1 prop Z test

2 prop Z Interval

2 prop Z test

(1) We take an SRS of 100 teachers from school district A and find that 72% of them state that they like their jobs. We then take an SRS of 120 teachers from school district B and find that 78% of them state that they like their jobs. Establish a 92% confidence interval estimate for the difference and interpret.

$$\hat{p}_1 = 0.72 \quad n_1 = 100 \quad \hat{p}_2 = 0.78 \quad n_2 = 120 \quad CL = 92\% \quad z^* = 1.751$$

2 Proportion z-interval

$$CI: (0.72 - 0.78) \pm 1.751 \sqrt{\frac{(0.72)(0.28)}{100} + \frac{(0.78)(0.22)}{120}}$$

(2) A researcher thinks that more than 25% of laboratory mice will show improvement from his new medication. He takes an SRS of the mice and finds that 27 out of 80 mice show improvement. Test the claim at the 0.03 level of significance.

$$p = 0.25 \quad n = 80 \quad \hat{p} = \frac{27}{80} = 0.3375 \quad \alpha = 0.03$$

$H_0: p = 0.25$
 $H_a: p > 0.25$

1 Proportion z-test

$$z = \frac{0.3375 - 0.25}{\sqrt{\frac{(0.25)(0.75)}{80}}}$$

(3) A school board has proposed a new school calendar in which the school year is 180 days long. An SRS of 150 teachers is taken and finds that 98 of them support the new plan, while an SRS of 120 seniors in the district finds that only 37 support the plan. At the 1% significance level, is there sufficient evidence of a difference between the two age groups?

$$\hat{p}_1 = \frac{98}{150} \quad n_1 = 150 \quad \hat{p}_2 = \frac{37}{120} \quad n_2 = 120 \quad \alpha = 0.01$$

2 Proportion z-test

$$\hat{p}_{pooled} = \frac{98 + 37}{150 + 120} = \frac{135}{270} = 0.50$$

$$z = \frac{\frac{98}{150} - \frac{37}{120}}{\sqrt{\frac{(0.50)(0.50)}{150} + \frac{(0.50)(0.50)}{120}}}$$

$$H_0: p_{so} = p_{sr}$$
$$H_a: p_{so} \neq p_{sr}$$

(4) In a random sample of fresh produce at a supermarket, 22 out of 280 pieces of produce were found to have been damaged/bruised. Establish a 95% confidence interval estimate for the proportion of produce that are damaged/bruised.

$$n = 280 \quad \hat{p} = \frac{22}{280} = 0.0786 \quad z^* = 1.960$$

1 Proportion z-interval

$$CI: \frac{22}{280} \pm 1.960 \sqrt{\frac{\left(\frac{22}{280}\right)\left(\frac{258}{280}\right)}{280}}$$

Sentences to have memorized:

1. Conclusion to an interval

We are ___% confident that the true parameter is between ___ and ___.

2. What does 95% confidence mean?

___% of all random samples of size parameter will produce confidence intervals that catch the true ___.

3. Conclusion to a test

We reject/fail to reject H_0 b/c the p-value of ___ is \geq than α = ___. We have sufficient/insufficient evidence that ___(H_a)_.

4. Interpret the P-Value in context

There is a ___% chance of getting a sample where ___ or more extreme, if the claim of ___ is true.

5. Type I and Type II Error

Type I = reject H_0 , when H_0 is true

Type II = fail to reject H_0 when H_0 is false

6. Power

Prob. of rejecting H_0 when H_0 is false

Do the In-class review worksheet